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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/539,654

02/16/2006

Elio Marioni

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EXAMINER

ROGERS, DAVID A

ART UNIT	PAPER NUMBER
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2856

MAIL DATE	DELIVERY MODE
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10/17/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/539,654

Applicant(s)

MARIONI, ELIO

Examiner

David A. Rogers

Art Unit

2856

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 June 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-5 and 9-12 is/are rejected.
- 7) ☒ Claim(s) 6-8, 13 and 14 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 14 June 2005 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 6/14/2005
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- ☐ Notice of Informal Patent Application
- ☐ Other: _____

DETAILED ACTION

Drawings

1. The drawings are objected to because of the following:
 - a. Figures 1 and 2 should show the corresponding axis labels.
 - b. Figure 3 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). As seen in United States Patent 6,053,705 to Schöb *et al.* a synchronous motor is provided with a plurality of stator poles and windings along with a Hall sensor.
2. Corrected drawing sheets in compliance with 37 C.F.R. 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 C.F.R. 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and

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informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

3. Claim 4 is objected to under 37 C.F.R. 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. On page 5 (lines 5-12) it is stated:

As it is well known, this load angle ϑ represents the phase shift between the voltage applied to the terminals of the motor 12 and the counter-electromotive force generated by adding the effect of the stator 16 flux and of the flux induced by the rotor 14 permanent magnet rotation.

When the load applied to the axis of the pump connected to the motor 12 varies, also the torque applied to the rotor 14 of the motor 12 varies, modifying thus the phase shift angle between the counter-electromotive force and the network voltage, i.e. exactly the load angle ϑ .

Therefore, the network voltage is the same as the voltage applied to the terminals which is a value already specified in claim 1.

Claim Rejections - 35 U.S.C. § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1-4 and 9-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over United States Patent 6,239,563 to Kunz, United States Patent 5,728,951 to Van Cleve *et al.*, the admitted prior art, and United States Patent 6,710,562 to Kalb *et al.*

Kunz teaches that synchronous motors are known to be used to drive pumps. See column 1 (lines 16-20). The synchronous motor shown in figure 1 has a rotor (reference item 9) equipped with permanent magnets which is driven in rotation by an electromagnetic field generated by a stator (reference item 2) equipped with pole pieces (reference item 3 and 4) having windings (reference items 5 and 6). The rotor must be the element that drives the pump. The pump also has a Hall sensor (reference item 10). Kunz does not teach determining flow rate of the pump by through acquiring a pump operation variable.

Van Cleve *et al.* teaches that a motor's torque required to spin rotors is directly proportional to the flow rate. See column 3 (lines 14-20). Official notice is hereby taken that lookup-type correlation tables are well known. Furthermore, the fact that a motor's torque is directly proportional to the flow rate would lead to a simple lookup-type correlation table so that once torque was obtained the corresponding flow rate can be determined.

The admitted prior art teaches at page 1 (lines 12-16):

As it is well known to the skilled in the art, fluid circulation pumps are mounted for example in heating and/or conditioning systems, but also in household and industrial washing machines.

electromotive force so that complexities with directly monitoring of the torque can be avoided.

With regard to claim 2 the creation of the lookup-type correlation table must be done with experimental test data or computer simulations. Van Cleve *et al.* already specifies that it is known that torque is related to flow rate so running experiments or theoretical/computer simulations would have been obvious in order to provide the lookup-type correlation table.

With regard to claim 3 official notice is hereby taken that it is known to monitor flow rates in pump continuously. This would require monitoring the phase shift continuously.

With regard to claim 4 the applicant admits that it is known that the load angle is the phase shift between the voltage applied to the terminals and the counter-electromotive force. The voltage applied to the terminals is the network voltage and must be a measured value.

With regard to claim 9 it would have been obvious to provide an electronic device having memory containing the lookup-type correlation table that links flow rates with the phase shift.

With regard to claims 10 and 11 the Hall sensor of Kunz would have to be either analog or digital. Official notice is hereby taken that analog and digital Hall sensors are known and are known alternatives to each other.

6. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kunz, Van Cleve *et al.*, the admitted prior art, and Kalb *et al.* as applied to

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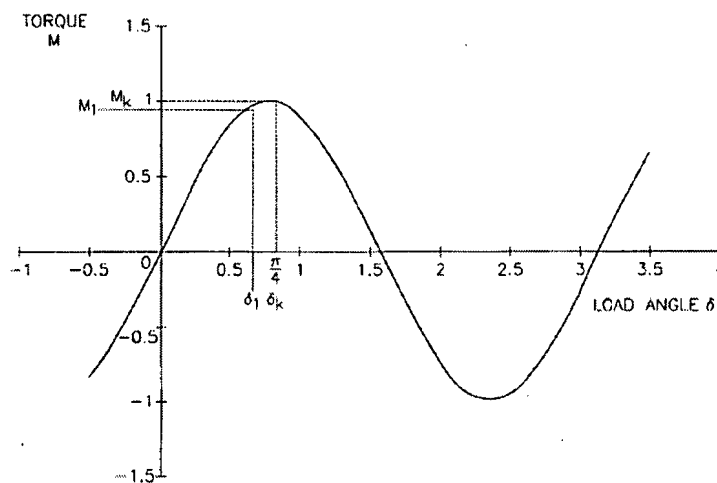
Their current production is almost performed with asynchronous motors. Models with synchronous motors have been introduced only recently.

The admitted prior art also teaches at page 5 (lines 5-12):

As it is well known, this load angle ϑ represents the phase shift between the voltage applied to the terminals of the motor 12 and the counter-electromotive force generated by adding the effect of the stator 16 flux and of the flux induced by the rotor 14 permanent magnet rotation.

When the load applied to the axis of the pump connected to the motor 12 varies, also the torque applied to the rotor 14 of the motor 12 varies, modifying thus the phase shift angle between the counter-electromotive force and the network voltage, i.e. exactly the load angle ϑ .

Kalb *et al.* also shows the known relationship between the load angle and torque on a synchronous motor. See, for example, figure 4:



It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teachings of Kunz with the teachings of Van Cleve *et al.*, the admitted prior art, and Kalb *et al.* in order to indirectly determine the flow rate of the pump by acquiring the phase shift of the motor between the voltage applied to the terminals of the motor and the counter-

claim 1 above, and further in view of United States Patent 6,093,986 to Windhorn.

Kunz, Van Cleve *et al.*, the admitted prior art, and Kalb *et al.* teach measuring the phase shift of a synchronous motor for determining flow rate. Kunz, Van Cleve *et al.*, the admitted prior art, and Kalb *et al.* do not expressly teach measuring rotor temperature.

Windhorn teaches that it is known to measure rotor temperature. See column 1 (lines 6-16).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teachings of Kunz, Van Cleve *et al.*, the admitted prior art, and Kalb *et al.* with the teachings of Windhorn in order to measure temperature of the rotor so that the performance of the synchronous motor can be monitored.

7. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kunz, Van Cleve *et al.*, the admitted prior art, and Kalb *et al.* as applied to claim 9 above, and further in view of United States Patent 3,492,555 to Shibata.

Kunz, Van Cleve *et al.*, the admitted prior art, and Kalb *et al.* teach monitoring the phase shift/load angle of a synchronous motor in order to determine the flow rate. The electronic device necessary to process the measured data must be able to use the correlation table in order to generate an output that is a measure of the flow rate. The synchronous motor must have terminals that must be hooked up to a current source in order to drive the

motor. Kunz, Van Cleve *et al.*, the admitted prior art, and Kimura *et al.* do not expressly teach the use of a voltage regulator.

Shibata teaches that it is known that voltage regulators are used to connect to devices that can be a synchronous motor.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teachings of Kunz, Van Cleve *et al.*, the admitted prior art, and Kalb *et al.* with the teachings of Shibata in order to use a voltage regulator to drive the motor in order that too-high voltage draws are avoided.

Allowable Subject Matter

8. Claims 6-8, 13, and 14 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

United States Patent 5,122,715 to Kimura *et al.* also shows the dependence of motor torque with load angle/phase difference and counter electromotive force on column 5 (lines 15-31):

Since this construction forms a feedback loop, that is, a phase controlled loop wherein the phase difference between the counterelectromotive voltage generated in the motor driving coils and the power supply switching signal for the driving coils that is synchronized with an output from the reference signal generator is detected so that a motor driving torque can be controlled in dependence on the detected phase difference with the counterelectromotive voltage for the driving coils having a predetermined phase relationship with the output from the reference signal generator, a speed control and a

drive of the brushless motor are possible without using the position detector for the movable element hitherto required and, therefore, the a brushless motor which is compact, low in price, high in reliability, and so, can be realized.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to David A. Rogers whose telephone number is (571) 272-2205. The examiner can normally be reached on Monday - Friday (0730 - 1600). If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hezron E. Williams can be reached on (571) 272-2208. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

11. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/David Rogers/
Examiner - Group Art Unit 2856